Film colors. Materiality, technology, aesthetics

Flückiger, Barbara

Film Colors

Materiality, Technology, Aesthetics

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One of the most fascinating phenomena of color film is its immense variety of materials and forms. In the cinema, filmic materiality manifests in fleeting apparitions of illuminated color on the screen, subject to constant change, an ephemeral phenomenon, a sensory experience of an uninterrupted stream of images. The colored light itself can be seen on screen, while the material basis of film remains hidden in the *dispositif* of the cinema or other forms of media representation. In other words, film projection creates the impression of dematerialization, which is even more pronounced in digital screenings than in the mechanical projection of analogue film.

Color Mania: The Material of Color in Photography and Film brings into focus this largely hidden material dimension of color, with the goal of connecting the fascinating abundance of technical innovation and aesthetic forms with the sensory and haptic experience of film material itself.

Every color process has particular characteristics that can be investigated using the concept of *material aesthetics* as an interaction between material base and aesthetic appearance. The term *faktura* refers to the image structure that results from the interplay between various layers of film as a three-dimensional material aesthetic object. These layers consist of a plastic substrate—nitrocellulose, di- or triacetate, or polyester—which lends the film strip its mechanical strength and flexibility; one or more layers of emulsion with a silver image; color application or clouds of dye embedded in the layers; as well as various traces of usage inscribed into the film material by the passage of time, such as scratches, dust, microbial infestations, mechanical damage, or physical decay.

On Autonomous Colors in the First Decades of Cinematography

Ever since the invention of film, there have been attempts to enrich the black-and-white silver image with color. At the outset, the most common method was to apply color to black-and-white prints of films using tinting, toning, hand coloring, or stencil coloring. *Tinting* (German: *Virage*, French: *teintage*), meant dipping the film strip in color

baths—solutions of synthetic dyes—so that monochrome dyed segments emerged in a variety of shades. This method can be clearly identified by the color in the perforated areas of the film material. *Toning* (German: *Tonung*, French: *virage*) has a more or less complementary relationship with tinting. Once again, the film was immersed in one or more baths in order to replace the silver image with metallic pigments or dyes; the dark areas became colored, while the light areas remained transparent. In *hand coloring* and *stencil coloring*, women applied color to selected areas of the frame image by image, particularly to human figures or to décor and landscapes. This work was done either freehand or, in the Pathécolor process, with the help of tiny cutout stencils.

→ Fig. I

→ Fig. II

→ Fig. 1

Within the framework of a theory of representation, all four processes belong to the domain of *autonomous film colors*, which bears little or no relationship to the depicted object or to the "profilmic" world in front of the camera.[1] In the case of stencil coloring in particular, there was an increasing trend toward detailed reproduction that began in the 1910s, aimed at creating a reality effect in documentary forms like travelogues or fashion films. However, this goal was only partially achievable with this technique, since the colorists—the majority of whom were women—were not witnesses to the recorded scenes.

In material aesthetic terms, tinting and coloring processes both exhibit an interaction between the black-and-white silver image and the applied colors, with copious nuances and a rich interplay especially in the middle tones, where many visible shades emerge between the silver grains and dyes. In tinting, the palette includes every hue at varying degrees of intensity—from the finely shaded and highly transparent to dark, saturated colors—depending on the concentration, temperature, or duration of the color baths. Changing hues and subtle nuances are particularly visible in splices where two differently—or indeed similarly—colored film segments have been joined together. Cuts are therefore particularly useful in helping identify film material and determining its history and genealogy.

→ Fig. III

→ Fig. IV

Shades of amber and the related hues beige, yellow, and orange dominate in tinted films along with blues and greens. There is no established rule connecting particular colors to narrative constellations, except for the tendency to represent night scenes in blue or green and lamp- or candlelit interiors in amber. Fire scenes tend to be colored red, but red can also dominate in other contexts, such as dreams. Pink tones conventionally connote feminine interiors. Every film develops its

→ Fig. 2

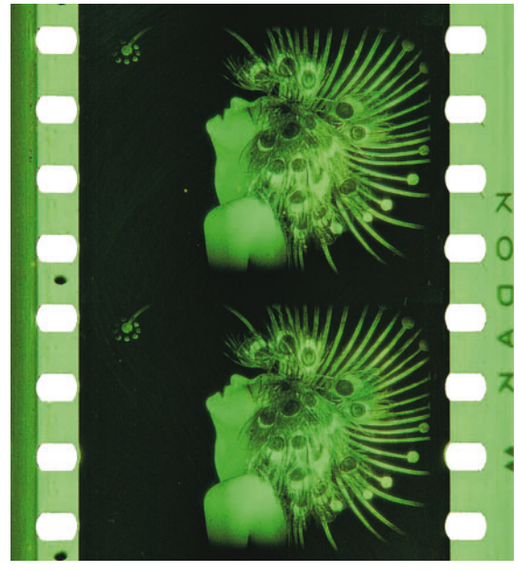

Fig. I Green tinting in SALOMÉ (Charles Bryant, USA 1922). Tinted section of a tinted, toned, and Handschiegl nitrate print, 35 mm. Credit: George Eastman Museum. Photo: Barbara Flueckiger

Fig. II Blue toning in DIE HOCHBAHNKATASTROPHE (Valy Arnheim, GER 1921). Toned section of a tinted and toned nitrate print, 35 mm. Credit: DFF – Deutsches Filminstitut & Filmmuseum. Photo: Barbara Flueckiger

Fig. III Enlargement from the stencil-colored film CASANOVA (Alexandre Volkoff, FRA 1927), showing the interaction between silver image and color application. Stencil-colored diacetate film, 35 mm. Credit: Cinémathèque française. Photo: Barbara Flueckiger

Fig. IV Splice in MALOMBRA (Carmine Gallone, ITA 1917). Tinted section of a tinted and toned nitrate print, 35 mm. Credit: Cineteca di Bologna. Photo: Barbara Flueckiger

Fig. V Frontal precision staging in LA VIE ET LA PASSION DE JESUS CHRIST (Lucien Nonguet and Ferdinand Zecca, FRA 1903). Stencil-colored nitrate film, 35 mm. Credit: EYE Filmmuseum. Photo: Olivia Kristina Stutz

→ Fig. 3

→ Fig. II

→ Fig. 4

→ Fig. 5

→ Fig. 1

→ Fig. V

own structural arrangement of color segments, in order to orient the audience to the film's spatiotemporal structure and enable spectators to recognize settings or times of day. It is not uncommon for various prints of the same film to have different color schemes.

Compared to tinting, the color spectrum in *metallic toning* is more limited; the predominant hues are sepias and browns, which are created from copper, sulfur, or even uranium, and blue produced in many variations using iron blue, also known as Prussian blue. The toning process was and continues to be widespread in photography as well, and sepia toning in particular is still indicative of a nostalgic mode of representation, which is why it is often used in film and photography alike to indicate memories or flashbacks.

Image composition, aesthetics, and complexity create completely different impressions in hand and stencil coloring. Early examples of hand coloring are characterized by black backgrounds. The figures appearing in the foreground are assigned colors or color gradations, as in dance performances in the style of Loïe Fuller's *Serpentine Dance*, where the color attribution imitates colored stage lighting.[2]

In the first decade of the twentieth century, stencil coloring tended to be gaudy, as required by the ostentatious style often called the "cinema of attractions."[3] But strict periodizations are problematic. Rather, the conventions of particular genres determine stylistic choices. There is thus a notable difference between the films of Georges Méliès, Gaston Velle, and Segundo de Chomón with their fantastical stage magic on the one hand, and historical epics or documentary forms on the other.

High-contrast or dark sections are more commonly found in the background of stencil-colored films, while the dominant color application is reserved for human figures, who are accordingly dressed in light hues, allowing the colors to shine out and create a strong figure-ground separation. The *faktura* emerges from the interplay between the grain structure and the thin, transparent color application, preferred for light or pastel tones, preserving the silver image and its characteristics. Hues of varying density can intensify the impression of plasticity, giving rise to tableau-like, often symmetrical compositions typical of the era's precision staging, which sought to optimize legibility in static images.

Although the art of stencil coloring reached an incredible level of accuracy and refinement in the second decade of the twentieth century—especially in documentary forms like animal and travel films—the 1920s saw yet further advances in aesthetic subtlety. In particular, as can be clearly observed in fashion films, the materiality of costume and set decoration were enriched in a nuanced way.[4] The French film CASANOVA (Alexandre Volkoff, FRA 1927), made in the late 1920s, is a masterpiece in its sophisticated use of material details, of patterns, textures, and surface qualities within the constraints of a stencil-colored *faktura*. Not only do different fabrics create varying densities of image structure, but individual highlights are also accentuated with the application of shimmering yellow, or light reflecting off the water, staged as a play of colors.

→ Fig. 6

→ Fig. III

Mimetic Processes

Parallel to autonomous applied colors, various *mimetic* approaches to color emerged. Mimetic color processes attempted to establish an equivalency between the depicted object and its representation in the film image, on the basis of mechanical or optical principles. The variety is so immense that this short essay cannot come close to covering all the different forms that were introduced. They extended from rotating filters or alternating green- and red-colored images to screen processes, in which lines or points of color create a color impression in the eye of the beholder similar to pointillist paintings, as in the Lumière Brothers' Autochromes. In this domain, the relationship between photography and film is closest, as the inventors of color film often relied on established principles of still photography, discovered by Louis Ducos du Hauron and Charles Cros back in the 1860s.[5]

Subtractive color processes contain dyes or pigments in two or more emulsion layers, applied to one or both sides (*double-coated*) of the film strip. They filter the light out, creating black when all the dyes are embedded at maximum density in the emulsion.

In the first decades of film history, from the mid-1910s to the early 1930s, two nearly complementary colors—such as green-blue and red-orange—were used to this end, which, however, did not come close to representing the full spectrum of colors. The main point of reference was the reproduction of skin tones, white skin to be precise. The preferred subjects for test recordings were young female models with symmetrical features, whose skin tone was optimized for the color process using specific makeup.

→ Figs. 7+8

In terms of material aesthetics, significant differences between the various processes are reflected in preferences for particular subjects and genres, as well as the selection of profilmic materials, surfaces and textures, creating a feedback loop. For instance, Kodachrome Two-Color—a subtractive process introduced in 1915, with two layers in red-orange and blue-green toning—creates dense, saturated images. Owing to its limited sensitivity, the film material seems to have required performances that were either static or restricted to slow movement. In surviving fashion films and test recordings, models pose facing the camera in front of dark, unsaturated backgrounds, dressed in shimmering fabrics like brocade or velvet, in the colors of the film material, extended to include gold and occasionally brown tones, decorated with feathers, fur appliqués and embroidery.[6] Even in the dance film THE FLUTE OF KRISHNA (Eastman Kodak, USA 1926), a fusion of modernist and ornamental Indian-oriental elements, the posed staging is visible in every frame, creating a series of seemingly frozen tableaux.

→ Fig. VI

Although it also consists of two layers—one a blue verging on turquoise and one a muted red-orange—Prizmacolor (also known as Prizma II) generates much more transparent images, although paler and less saturated. In these pictures, the *faktura* appears somewhat dirty, often exhibiting a vertical line pattern, possibly drawing on the older Kesdacolor process invented by William van Doren Kelley. The inventor's stated goal was to depict the world in color, in a series of travelogues that were produced by his own company. He set out to capture scenes from far-flung corners of the world, from Japan, Bali, Africa, and the Middle East, not only with the exoticism typically favored at the time, but also with a distinctly ethnographic eye to details of lifestyle and tradition, whose evident interest in knowledge and discovery can be found in nature documentaries as well. Prizma II eventually gave rise to the very first feature film in mimetic colors, THE GLORIOUS ADVENTURE (J. Stuart Blackton, GBR 1922).

→ Fig. VII

Artistic Experiments of the Avant-Garde

The experimental character of early mimetic color processes found a perfect field for experimentation in abstract animation, especially the artistic work with color, form, movement, and rhythm found in the absolute film of the European avant-garde of the 1920s and 1930s. The term "absolute" reflected the essential specificity of film as a medium and the material conditions governing it as an art form.

Detached from a representational function, these abstract films focused on the connection between surface and time in rhythm in accordance with modernism's central preoccupation with reducing each art form to its essence.

Loyd A. Jones's experimental film [KALEIDOSCOPE] (USA circa 1927) was produced in Kodachrome Two-Color. Oskar Fischinger, after Walter Ruttmann the best-known exponent of abstract film, produced his works in Gasparcolor.[7] Ruttmann, on the other hand, made his earliest absolute films LICHTSPIEL OPUS II, III, and IV (GER 1921–1925) with tinting and partial hand coloring, with particular attention paid to the *faktura* in continuous grayscale and gentle gradations that enhance the grain structure of the film through the texture of the image. LE BALLET MÉCANIQUE (*The Mechanical Ballet*, Fernand Léger and Dudley Murphy, FRA 1923) exposes the *faktura* too, albeit in a different way. Tinted film segments of abstract geometric figures, processed manually via dip dye, are combined with live action in black and white.[8] Smudgy traces of the color application can be seen on the splices, beyond the borders of the frame.

→ Fig. 9

→ Fig. 10

Artist Len Lye's work is a particularly rich treasure trove showing the material aesthetics of the different color processes that are the focus of this introductory chapter. Because they utilize three different mimetic three-color processes—Gasparcolor, Dufaycolor, and Technicolor No. IV—Lye's films are among the most striking examples of the reciprocal relationship between material, form, and style. He produced them as *direct animation* by painting directly onto the film strip, a form of abstract hand coloring, which he subsequently transferred via three-color process to prints for exhibition.

→ Figs. 11–13

In its pure form, this process could only be completed in the line-screen process Dufaycolor, for only Dufaycolor features a uniform color coating and can be continuously exposed. The other processes have to be exposed frame by frame, creating a line between each frame. But Lye was unenthused about the somewhat dull, undersaturated colors produced by the whitening effect of the additive filters. By contrast, Gasparcolor, with its pure, brilliant, highly saturated, and dense hues, was ideal for Lye's clashing color schemes. Unlike Dufaycolor's line screen, it reveals hardly any image structure. Compared with Gasparcolor, the prints in Technicolor No. IV appear less lustrous, despite Technicolor's dense color layers, but the mechanical printing process generates highly idiosyncratic colors, often described as the

→ Fig. 11

→ Fig. 12

Fig. VI Ornamental tableaux in THE FLUTE OF KRISHNA (Anonymous, USA 1926). Kodachrome Two-Color, nitrate film, 35 mm. Credit: George Eastman Museum. Photo: Barbara Flueckiger

Fig. VII Ethnographic documentary film in Prizmacolor ON THE TREK (Anonymous, USA ca. 1920). Prizma II, nitrate film, 35 mm. Credit: Library of Congress. Photo: Barbara Flueckiger

"Technicolor look," and thus creates a notable shift in the intended color concept.

→ Fig. 13

Technicolor's Dominance

When Technicolor No. IV was introduced in the mid-1930s, its singular achievement was to set in motion a process of consolidation and standardization that led to around twenty years of dominance by the Technicolor company. After nearly two decades of mostly failed attempts and a flash in the pan with the two-color process Technicolor No. III in the late 1920s, the company had come to understand the complex rules of film production and established their process with a thoroughly controlled workflow. At its core was the Color Advisory Service, which oversaw the creative conceptualization of a film's color scheme. In line with Hollywood norms, the scheme had to serve narrative functions and to support the film's reception with clear image compositions.[9] The color scheme was geared to the female star, in particular her skin tone and hair color.

Technicolor Nos. III to V are printing processes that are referred to as *dye transfer* or *imbibition*. Technicolor No. IV required the simultaneous exposure of three 35 mm camera negatives via the beam splitter in its sturdy camera, which was both bulky and heavy.[10] Subsequently, three color-separation positives were processed into printing matrices in yellow, magenta, and cyan. In the dye-transfer process, they were registered exactly to form the color image on the Technicolor film print, which contained the frame lines plus a soundtrack in black and white. These elements, which contain silver, generally make Technicolor prints easy to identify. The *faktura* of Technicolor halftone prints shows comparatively unstructured, dense, paste-like colors that glow darkly. It is thus fundamentally distinct from the grain structure of the silver image, and also from the color clouds of chromogenic film, which will be discussed below. Owing to minimal tolerance in the printing process, even the slightest registration error can cause color fringing. Technicolor thus has shortcomings in the reproduction of detail that led to a tendency to avoid small-scale variations in costume and interior design. Similarly, Technicolor advised cinematographers to steer clear of images with deep blacks and very bright highlights—even white costumes were always slightly cream-colored—for neither end of the luminosity spectrum can be properly recorded and thus both distort the images' color appearance. Accordingly, the lighting tended to be homogeneous and controlled, even when dim low-key lighting or chiaroscuro demanded a play with light and shadow.

Following the aesthetic norms of the time, primary hues were often slightly broken,[11] because excessively gaudy, highly saturated images were seen as markers of bad taste. Paradoxically, however, Technicolor had inscribed itself in the public imagination precisely as the epitome of excessive color use, an impression that can be traced back to individual key scenes and, in particular, to certain genres: the fiery red sky over Atlanta in GONE WITH THE WIND (Victor Fleming, USA 1939), the bilious green and yellow sets in THE WIZARD OF OZ (Victor Fleming, USA 1939), the orientalism in THE THIEF OF BAGHDAD (Ludwig Berger, Michael Powell, and Tim Whelan, GBR 1940), or BLACK NARCISSUS (Michael Powell and Emeric Pressburger, GBR 1947), as well as the color explosions in musicals like GENTLEMEN PREFER BLONDES (Howard Hawks, USA 1953), COVER GIRL (Charles Vidor, USA 1944), or THE GANG'S ALL HERE (Busby Berkeley, USA 1943). Technicolor films generally abide by restrictive color schemes, in which achromatic, often grayscale or earth-toned backgrounds optimally support the figure-ground separation. Various genre conventions therefore played a decisive role in the choice of color aesthetics. Westerns are unsurprisingly marked by the quite colorless, earth-toned universe of American prairies and log cabins. Melodramas have a special status, since the excessive abundance of detail in the set design served the narrative by projecting repressed emotions onto the décor.[12]

→ Fig. 14

→ Fig. 15

→ Fig. 16

Colored lighting had already been established as a specialty in the 1920s, with the two-color Technicolor No. III process. Called *mood lighting*, it was also used in Technicolor Nos. IV and V to create atmospheres that reflected the subjective mental states of the characters. An analysis of a large body of Technicolor films reveals that cinematographer Ray Rennahan who represented the company on set, experimented early on with daring light compositions in order to create atmosphere and subtly influence the affective experience of the audience.

→ Fig. 17

→ Figs. 18+19

→ Fig. 17

Multilayered Chromogenic Process

Technicolor had serious drawbacks, in terms not only of its handling but also of its characteristic color shifts, its low resolution for fine detail, and limited contrast range. As a printing process it was based on mechanical principles and was therefore subject to a nineteenth-century epistemological order, in which psychophysics had attempted to define human perception as mechanical operations.

With the invention of the *chromogenic process*, the principles moved into the realm of chemistry. "Chromogenic" means that the colors emerge through chemical development. In chromogenic film stocks, chemical substances known as dye couplers are embedded with silver halide crystals in the individual layers of the emulsion. After development, the layers contain dyes in yellow, magenta, and cyan, while silver is generally bleached out. In contrast to the silver grain, these finely distributed color dyes can be described as dispersed color clouds.

The look and feel of the image are now completely different. The incident light of the projector illuminates the color clouds with a glow; fine color gradients and small-scale details are increasingly well depicted. Generally, the films display a lower optical density and therefore appear more transparent and luminous.

→ Fig. 20

This class of mimetic color processes includes Kodachrome, a 16 mm reversal process, in which the positive image is exposed in-camera;[13] the later negative-positive processes Agfacolor, Eastman Color and Fujicolor, as well as numerous derivatives under a variety of brand names.[14]

→ Fig. 21

If the Technicolor era was marked by the company's centralized control, with a penchant for standardized forms within generic frameworks and distinct personal styles, there now emerged an extraordinary plurality, defined not least by different cultural contexts as producers around the world switched over to color film. This brief essay cannot possibly do justice to the complex intertwining of historical, political, and cultural factors that shaped film production from the 1950s onward.

The following passage is thus restricted to a small number of significant movements in the color film aesthetics of chromogenic film. European new wave cinema used color in a very conscious manner—the French Nouvelle Vague in particular, which, starting in the late 1950s, broke away from the classical narrative cinema that it despised as *cinéma de papa* ("Dad movies"). In Jean-Luc Godard's early color films, diffused, high-key lighting meets matte, plain-colored costumes in red or blue hues and desaturated, generally white backgrounds. These straightforward image compositions are reminiscent of comics or pop art. Filmmakers like Michelangelo Antonioni and Jacques Demy colored entire landscapes or city blocks in order to externalize the characters' inner worlds or to create an alienation effect through artificial stylization.

Both strategies can be found in Demy's work: the sober, modernist concept and a penchant for ostentatious excess, visible in THE UMBRELLAS OF CHERBOURG (FRA 1964) with a multitude of coarsely patterned wallpapers in boldly contrasting colors of pink, red, orange, and violet. A similar kind of excessive work with color, pattern, texture, and various surface elements in the form of costume and décor is a stylistic device deployed by the ironically overstated James Bond parody MODESTY BLAISE (Joseph Losey, GBR 1966), as well as in Italian *giallo* films by Mario Bava and Dario Argento.[15] It lives on in Pedro Almodóvar's melodramatic comedies, in which eccentric women on the verge of a nervous breakdown display their feelings.

Alongside the excessive deployment of clashing colors, increasingly monochrome color schemes emerged in cinematography, through the use of colored light, filters, and, most recently, digital color grading, the process of color correction in postproduction. Leading this trend is Polish cameraman Sławomir Idziak, who has collected an entire arsenal of filters in order to create affectively loaded atmospheres with monochrome saturated colors that transform the external world.

Conservation, Restoration, and Digitization

Today—after the radical shift to global digitization in film production and the cinema—we face the challenge of transferring the rich heritage of analog color film into the digital domain, so that it continues to circulate and remain visible.

This analog-digital transfer has turned out to be much more difficult than imagined. Among the greatest hurdles are the dye-fading processes to which many colors have fallen victim over the course of time, especially chromogenic film material from the 1940s through to the 1980s. Comprehensive colorimetric analyses are necessary in order to reconstruct the colors according to scientific criteria.[16]

Yet a scientific process alone is insufficient. Research into the aesthetics of color film and the material aesthetics of individual color processes are just as necessary as analyses of historical and personal styles. Comprehensive photographic documentation of a plethora of historical color film prints from archives is of paramount importance for the research into the material aesthetics of individual processes. Ideally, this would include all varieties and film stocks, thus producing the most complete picture possible of aesthetic developments and their material foundations. This documentation is a significant cornerstone

of the *Timeline of Historical Film Colors*.[17] It is complemented by studies on the technical underpinnings and professional norms of color film production as well as research on contemporary reception.

The foremost task, however, is to preserve and protect the abundant film heritage in the archives, in order to hand it over to the next generation. For in the future, we will have better methods to capture the full complexity of these wonderful objects.

1. In film studies, the term "profilmic" refers to the external reality that is recorded by the camera; however, it makes no difference whether the shooting happens in a studio or on location.
2. Joshua Yumibe, *Moving Color: Early Film, Mass Culture, Modernism*, New Brunswick, NJ: Rutgers University Press, 2012, 58. See also Olivia Kristina Stutz's text in this volume, "Such (Dye-)Stuff as Dreams Are Made On: Material Interactions between the Photography, Film, and Fashion Industries," 121–31.
3. Tom Gunning, "The Cinema of Attractions: Early Film, its Spectator and the Avant-Garde," in *Wide Angle* 8, nos. 3–4 (1986): 63–70.
4. See Stutz in this volume (see n. 2).
5. See Thilo Koenig's text in this volume, "(In)visible Color: Plea for a History of Color Photography," 51–70.
6. Ibid.
7. See Noemi Daugaard's text in this volume, "Avant-Gardist Colors in a Political Tug-of-War: Gasparcolor between Art and Fascism," 187–95.
8. Rossella Catanese, Guy Edmonds, and Bregt Lameris, "Hand-Painted Abstractions: Experimental Color in the Creation and Restoration of *Ballet Mécanique*," in *The Moving Image* 15, no. 1 (2015), 92–98.
9. Natalie M. Kalmus, "Color Consciousness," in *Journal of the Society of Motion Picture Engineers* 25, no. 2 (1935): 139–47.
10. See Michelle Beutler's text in this volume, "Standardizing Color Film: Technicolor No. IV and Agfacolor during the 1940s," 197–209.
11. Christine N. Brinckmann, "Chords of Color" (2006), in *Color and Empathy*, Amsterdam: Amsterdam University Press, 2015, 33–58.
12. Thomas Elsaesser, "Tales of Sound and Fury: Observations on the Family Melodrama," in *Imitations of Life: A Reader on Film & Television Melodrama*, ed. Marcia Landy, Detroit, MI: Wayne State University Press, 1991, 68–91.
13. See Bregt Lameris's text in this volume, "IMAGES DU MONDE VISIONNAIRE: The Representation of Hallucinogenic Vision in Various Ranges of Color," 151–62.
14. See the texts elsewhere in this volume by Josephine Diecke, "Agfacolor in (Inter)National Competition," 211–221, Michelle Beutler, "Standardizing Color Film" (see n. 9), and Joëlle Kost "Light and Shadow: Aesthetics in the Chromogenic Color Film of the 1970s," 165–75.
15. The *giallo* film is an Italian subgenre of the thriller, established in the 1960s and popular in the 1970s.
16. See the interview elsewhere in this volume, "'The Digitization of Analogue Colors Is Extremely Complex': David Pfluger, Giorgio Trumpy, and Martin Weiss in conversation with Simon Spiegel," 223–27.
17. *The Timeline of Historical Film Colors* is a comprehensive web resource on historical film color that has been developed and curated by Barbara Flueckiger since 2012 (filmcolors.org).

Fig. 1 Stencil coloring in the nonfiction film COIFFURES ET TYPES DE HOLLANDE (Alfred Machin, FRA 1910). Stencil-colored nitrate film, 35 mm. Credit: Cineteca di Bologna. Photo: Barbara Flueckiger

Fig. 2 Pink as a conventional coloring in DAS CABINET DES DR. CALIGARI (Robert Wiene, GER 1919). Tinted nitrate film, 35 mm. Credit: Friedrich-Wilhelm-Murnau-Stiftung, Cinémathèque française. Photo: Barbara Flueckiger

Fig. 3 Sepia toning in MALOMBRA (Carmine Gallone, ITA 1917). Toned section of a tinted and toned nitrate print, 35 mm. Credit: Cineteca di Bologna. Photo: Barbara Flueckiger

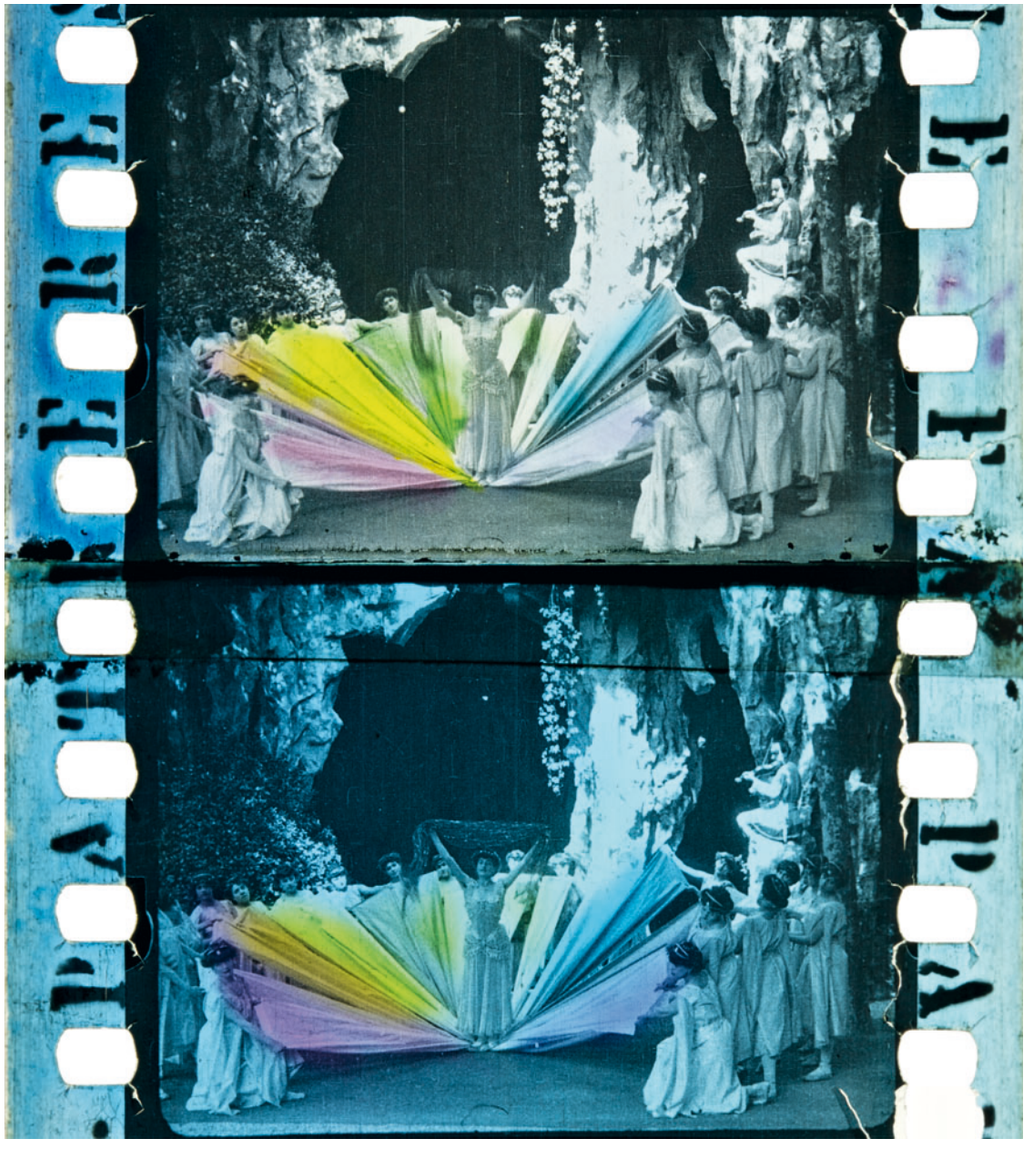

Fig. 4 Hand coloring with typical black background in MÉTAMORPHOSES DU PAPILLON (Gaston Velle, FRA 1904). Hand-colored nitrate film, 35 mm. Credit: Library of Congress.
Photo: Barbara Flueckiger

Fig. 5 Excessive coloring with tinting and stencil coloring in L'AMOUR D'ESCLAVE (Albert Capellani, FRA 1907). Tinted and stencil colored nitrate film, 35 mm. Credit: Library of Congress.
Photo: Barbara Flueckiger

Fig. 6 Material details in CASANOVA (Alexandre Volkoff, FRA 1927). Stencil-colored diacetate film, 35 mm. Credit: Cinémathèque française. Photo: Barbara Flueckiger

Fig. 7 Two-Color Kodachrome, with costumes and hair color optimized for the color process (from the series MCCALL COLOUR FASHION NEWS, anonymous, USA 1920s). Kodachrome Two-Color, nitrate film, 35 mm. Credit: Gert Koshofer Collection. Photo: Barbara Flueckiger

Fig. 8 Technicolor No. III two-color process in THE GARDEN OF EDEN (Lewis Milestone, USA 1928). Technicolor No. III, dye-transfer print, nitrate film, 35 mm. Credit: Margaret Herrick Library. Photo: Barbara Flueckiger

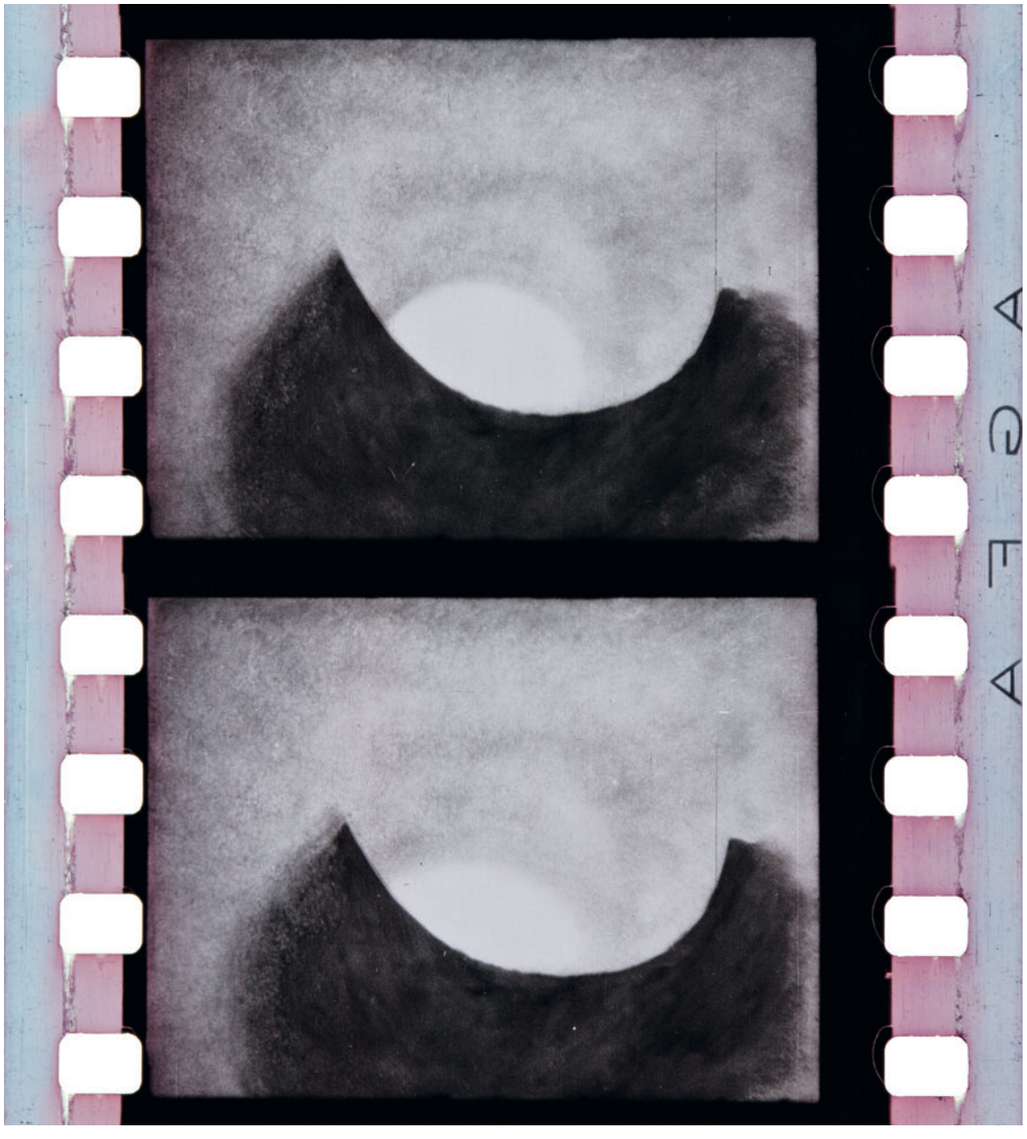

Fig. 9 Tinting and smooth gradations in LICHTSPIEL OPUS II (Walter Ruttmann, GER 1922). Tinted nitrate film, 35 mm. Credit: EYE Filmmuseum. Photo: Olivia Kristina Stutz

Fig. 10 Manual tinting in LE BALLET MÉCANIQUE (Fernand Léger and Dudley Murphy, FRA 1923). Tinted nitrate film, 35 mm. Credit: EYE Filmmuseum. Photo: Olivia Kristina Stutz

Fig. 11 Dufaycolor copy of A COLOUR BOX (Len Lye, GBR 1935). Dufaycolor, nitrate or diacetate film, 35 mm. Credit: BFI National Archive. Photo: Barbara Flueckiger

Fig. 12 Brilliant colors in the Gasparcolor copy of COLOUR FLIGHT (Len Lye, GBR 1937). Gasparcolor, nitrate film, 35 mm. Credit: The Museum of Modern Art, New York. Photo: Barbara Flueckiger

Fig. 13 Technicolor copy of MUSICAL POSTER NUMBER ONE (Len Lye, GBR 1940). Technicolor No. IV, dye-transfer print, nitrate film 35 mm. Credit: The Museum of Modern Art, New York. Photo: Barbara Flueckiger

Fig. 14 Imaginary world in THE WIZARD OF OZ (Victor Fleming, USA 1939). Technicolor No. IV, dye-transfer print, nitrate film, 35 mm. Credit: Academy Film Archive. Photo: Barbara Flueckiger

Fig. 15 Orientalism in THE THIEF OF BAGDAD (Ludwig Berger, Michael Powell, and Tim Whelan, GBR 1940). Technicolor No. IV, dye-transfer print, nitrate film, 35 mm. Credit: BFI National Archive. Photo: Michelle Beutler

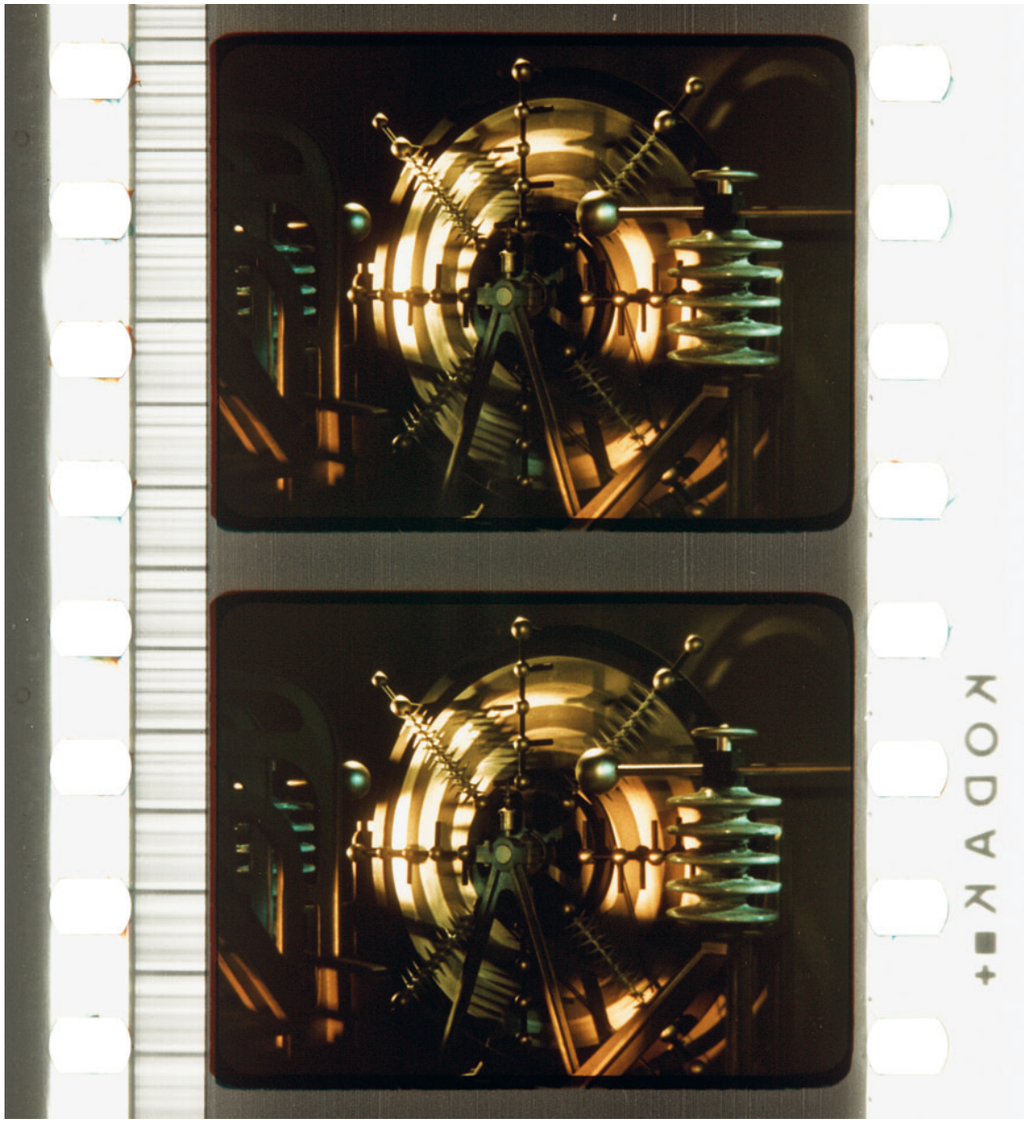

Fig. 16 Attention to detail in the décor of WRITTEN ON THE WIND (Douglas Sirk, USA 1956). Technicolor No. V, dye-transfer print, acetate film, 35 mm. Credit: Harvard Film Archive.
Photo: Barbara Flueckiger

Fig. 17 Colored lights in Technicolor No. III: DOCTOR X (Michael Curtiz, USA 1932). Technicolor No. III, dye-transfer print, nitrate film, 35 mm. Credit: UCLA Film & Television Archive.
Photo: Barbara Flueckiger

Fig. 18 Mood lighting in BLACK NARCISSUS (Michael Powell and Emeric Pressburger, GBR 1947). Technicolor No. IV, dye-transfer print, nitrate film, 35 mm. Credit: Academy Film Archive. Photo: Barbara Flueckiger

Fig. 19 Turquoise neon light in VERTIGO (Alfred Hitchcock, USA 1958). Technicolor No. V, dye-transfer print, acetate film, 35 mm. Credit: Harvard Film Archive. Photo: Barbara Flueckiger

Fig. 20 KIKA (Pedro Almodóvar, ESP 1993). Agfa-Gevaert, polyester film, 35 mm. Credit: Library of Congress.
Photo: Barbara Flueckiger

Fig. 21 Monochrome coloring in Sławomir Idziak's work TROIS COULEURS: BLEU (Krzysztof Kieślowski, FRA/POL/CHE 1993).
Agfa-Gevaert, polyester film, 35 mm. Credit: Library of Congress.
Photo: Barbara Flueckiger